

Research Article

Analysis of the Impact of County-Levelization on Economic Growth and Public Service Development Based on Panel Data

Wangteng Xu ¹ and Shaojian Wang²

¹*Xi'an University of Architecture and Technology, Xi'an 710055, Shaanxi, China*

²*Xi'an University of Science and Technology, Xi'an 710054, Shaanxi, China*

Correspondence should be addressed to Wangteng Xu; xuwangteng@xauat.edu.cn

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County-levelization has become an important vane and propeller of urban spatial development, which is closely related to economic development and public service development. County-levelization can effectively broaden the geographic scope of urban areas, enhance urban functions, and implement strategic planning measures for metropolitan areas. But what impact will such reform have on economic growth and public service development? What is the effect of the current policy of “abolishing counties and establishing districts” in the implementation process? Should the policy of “abolishing counties and establishing districts” be promoted or not? Based on a panel of 453 counties in China, this paper uses DID to analyze the impact of county zoning on county economic growth and public service development and uses PSM-DID to test the robustness. The study shows that county-levelization in China has had a positive effect on economic growth, but in the areas of education and health/public services, such reforms have only had a “squeeze effect” with minimal effect.

1. Introduction

In recent years, the policy of turning counties into districts (TCID) has been successively implemented in Shanghai, Xi'an, Zhengzhou, Chengdu, Hangzhou, and other big cities. The regional reform of the city has caused strong public concern. Some people speculate that China will enter an era of “no counties” in the future, and the municipal district will replace the county as the mainstream vehicle for administrative divisions [1]. Looking back at the objective reality of urban development in recent years, there has been rapid economic growth and a rising level of urbanization, while the imbalance between regional economic and social development has become increasingly prominent, and the profile of public services, such as education and medical care, is also rising rapidly [2]. Discussion of the real impact of TCID reforms on regional economic and social development, and whether they can promote growth and benefit the people's livelihood, will help to further reveal the laws of

urban development and ensure that such reforms better serve the people.

The data show that in the context of vigorously building a new pattern of urban development, TCID reform has become an important measure of regional development strategies. Taking Zhengzhou as an example, in the process of building a national central city, local officials in Zhengzhou have been actively promoting the reform of administrative divisions. From 2016 to 2018, in the process of implementing the TCID project in Zhongyu, Xiangyang, Xinzheng, Xinmi, and other places around Zhengzhou City, the official experienced a process of discourse transformation from “recommendation” to “struggle” to “acceleration.” The TCID reform has become an important weather vane and accelerator for Zhengzhou to expand its urban development space and build its status as an international commercial capital [3].

Throughout the country, the concept of TCID has become a new style of urban development. Figure 1 provides

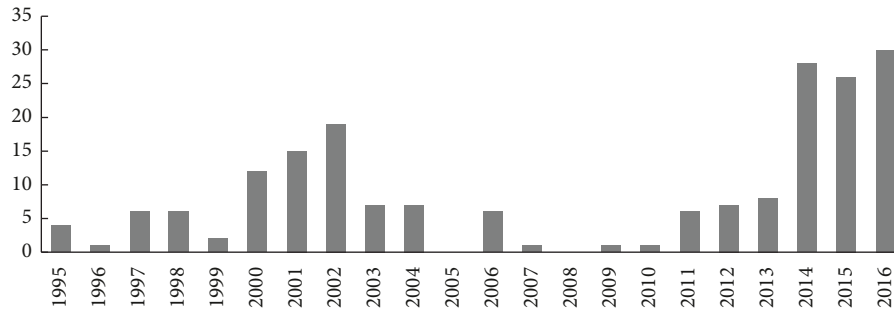


FIGURE 1: The number of TCIDs implemented in China from 1995 to 2016.

further statistics on the number of cities implementing TCID reforms in China from 1995 to 2016. Between 2000 and 2004, the number of cities implementing TCID reforms reached the peak of the first phase. During this period, a total of 60 cities implemented such reforms. In recent years, the momentum of TCID reforms has further increased, and such policies were implemented 84 times in the three years from 2014 to 2016.

For the administrative division to reform policies with high frequency and wide coverage, multiangle and all-round evaluation can effectively improve the scientificity and effectiveness of policy operations. The TCID reform has undoubtedly broadened the spatial scope of the central city, which is conducive to the formulation and implementation of the development plan of the metropolitan area [4]. However, questions remain as to whether the implementation of such reforms has accelerated economic growth in targeted counties, especially in terms of improving local public services such as education and health care. Exploring these issues is of great significance for ensuring and improving people's livelihoods in urban development [5].

Based on the panel data of 453 counties in China from 1999 to 2010, this paper uses the difference-in-difference (DID) method to conduct counterfactual causal analysis with reference to natural experiments and explore the effect of TCID reforms on economic growth and the development of public services. The main contributions of this paper are as follows:

- (1) Discussed the dual impact of such reforms on county-level economic growth and the development of public services, as well as demonstrated the economic and social effects of TCID policies.
- (2) Based on the construction of the dual model, the PSM-DID method is further introduced to test the robustness of the results, which can effectively avoid the sample selection bias and confounding deviation of the traditional DID method.
- (3) Improved the analysis of the mechanism of TCID reforms on economic growth and public service development, and discussed the interaction between such reforms and economic and social drivers, enriching the relevant results of the evaluation of TCID policies.

The other parts of this paper are organized as follows: The second part sorts out the background of the administrative division system of TCID reforms in China and

reviews related literature; the third part explains the empirical model, research scope, and data source; the fourth part introduces the variable selection and descriptive statistics of the sample; the fifth part includes the evaluation results and robustness test; and the sixth part is the conclusion.

2. Literature Review

China's administrative division is the primary means for the central government to pursue economic and social causes across the nation, and, to some extent, it is the shadow cast by state power in geographic spaces [6]. Back in early times, China established an administrative system characterized by a central government, regions, provinces, prefectures, and counties. In 1982, an early reform of regional administrative divisions was introduced. In China's 6th five-year plan, central leadership called for the use of cities, especially large- and medium-sized ones, as central places to organize and manage economic activities and to stimulate rural economic growth, with the hope that economic regions of different geographic sizes and administrative levels based on central cities could be formed eventually [7]. In 1983, a "city administering county" system was established across the country, with the governance hierarchy consisting of the central government, provinces, prefecture-level cities, counties, and townships.

Unlike the Western world, where the reform of administrative divisions is determined by civil autonomy, such reform is government-oriented in China. Since the country's reform and opening up, this effort has grown in strength. Of the reforms put in place, turning counties into cities (TCIC) and turning counties into districts (TCID) pertains to the city level. To prioritize small- and medium-sized cities and towns in the wake of national reform, TCIC reforms became a nationwide trend. Afterward, as of 1996, county cities had increased to 445 from 92 in 1978 [8]. The campaign, however, failed to fulfill hopes for economic growth and urban reform. Instead, such reform led to a surge in the number of cities, an ambiguous conceptualization of cities, and an abnormal type of urbanization [9]. Unsurprisingly, subsequent attempts were met with disapproval by the central government in 1997.

TCID reforms were initiated in the 1980s when counties and county-level cities were approved to transition to prefecture-level municipal districts. This trend has seen

rapid growth since the abortion of TCIC policies in 1997. Generally speaking, areas that want to implement TCID policies must go through the following process from application to implementation: First, the county-level government presents an application for reform, and the provincial and municipal governments agree to report to the Ministry of Civil Affairs and the State Council for approval; after a field visit, TCID reforms can be officially implemented. TCID reforms are a means of adjusting regional administrative relations. This type of reform has the following two distinctive features:

- (1) According to the ongoing jurisdiction system in China, a city consists of municipal districts and counties. A municipal government has direct jurisdiction over municipal districts but has limited jurisdiction over counties [10, 11]. With the implementation of TCID reforms, such administrative divisions are broken, allowing counties and municipal districts to coordinate in matters of urban planning, industry layout, and infrastructure construction [12].
- (2) This type of reform breaks the institutional barrier between cities and counties. Urban resources are channeled to counties as it is easier to access resources, which contributes to the migration of urban industries and the integrity and redistribution of public resources between regions.

There are volumes of insightful documents concentrating on the causes of the TCID boom. Decentralization is among the primary merits of reform and opening up. The M-structure resulting from decentralization in local governments has also catalyzed the economic miracle unleashed by China since reform and opening up [13]. Nevertheless, such a decentralization in China is not down to earth, which leads to a Chinese style “administration region economy” due to excessive intervention from local governments in terms of capital, labor, and land use [14, 15]. To inject vitality into local economies, allocate resources among cities, and improve urbanization, TCID policies have been introduced by the central government nationwide since the 1980s.

In China’s rigid administrative hierarchy, administrative rank is related to the status and power of key officials, as well as preferential policies and resources given to local governments; because of this, lower-level administrators are eager to advance their management ranks [16]. Research results show that county-level cities receive more favorable support than county-level cities in terms of taxation, land policy, and administration, which explains why county-level governments have a strong desire to implement TCIC policies [17]. Likewise, county-level officials are half a rank higher than the county in the administrative hierarchy and thus have more initiative to implement these policies. As a result, county officials tend to be very enthusiastic about TCID policies. Chinese officials’ inherent desire for promotion and power in the country’s urbanization process is reflected in the prosperous administrative division reform.

Disagreements remain regarding the practical significance of the TCID policies. Some argue that this pursuit leads to an array of problems: targeted counties lose control over their development, spurious, passive, and incomplete urbanization can occur [18]. Others point out that the targeted counties become more independent and enjoy economic growth without any sign of spurious urbanization [19]. Such reforms also contribute to the increased mobility of the population, with an increasing number of migrants pouring into cities [20]. In general, the debate on TCID policies mainly focuses on the economy and urbanization, with little discussion of the impact on public services. As the principal social contradiction and the philosophy of governance have changed, measuring the effect of TCID policies is conducive to their comprehension and evaluation.

3. Research Model

3.1. Empirical Model. When examining the impact of TCID policy on economic growth and public service development, it is necessary to control the interference of other factors as much as possible, especially the impact of macroeconomic trends on the regression results. The difference-in-difference (DID) method is usually used to solve this problem. The DID method is a commonly used strategy evaluation and analysis tool. The basic idea is to divide the sample into an experimental group and a control group. After feeling the impact of the policy, the net effect of the policy shock can be obtained by comparing the differences between the experimental group and the control group [21].

The county-level samples that have experienced TCID reform are taken as the experimental group of this study; then construct the research control group by selecting county-level samples that have not yet experienced TCID reform. In the subsequent processing of DID, the study samples were further divided into four subsamples: the experimental group before TCID, the experimental group after TCID, the control group before TCID, and the control group after TCID. Set the regression equation by introducing two dummy variables, du and dt ; see (1). Among them, $du = 1$ represents the county-level sample that has experienced TCID, $du = 0$ represents the county-level sample that has not experienced TCID, $dt = 1$ represents the sample after TCID, and $dt = 0$ represents the sample before TCID.

$$h_{it} = \alpha_0 + \alpha_1 du_{it} + \alpha_2 dt_{it} + \alpha_3 dt_{it} \times du_{it} + \sum_{i=1}^n \beta_i X_{it} + \varepsilon_{it}. \quad (1)$$

In equation (1), the subscripts i and t represent the i^{th} county-level sample and the t^{th} period, respectively, X represents a series of control variables affecting a county’s economic growth or public service development, ε is a random disturbance term, and h is the dependent variable. The interaction term $dt_{it} \times du_{it}$ is a DID variable. By assigning variables to the two dummy variables du and dt in equation (1), it can be seen that α_3 is the net effect of TCID policies on economic growth or public service development.

An important premise of using the DID model is that the experimental and control groups do not have other characteristics that affect economic growth or public service development, respectively. Obviously, in practice, the above assumptions are difficult to fully hold. In order to ensure the similarity of the sample characteristics of the experimental group and the control groups in various dimensions, this paper adopts the DID propensity score matching method (PSM-DID) for the robustness test [22, 23]. The core idea of the PSM-DID method is to make the two groups as close as possible by comparing the experimental group and the control group one by one from the perspective of various characteristics. The paired control group constitutes the counterfactual state of the experimental group. Comparing the differences between the experimental and control groups provides a clearer picture of the precise policy effects [24].

3.2. Research Scope

3.2.1. Time Range of the Study. The time range of this study was from 1999 to 2010, with a focus on county-level TCID samples from 2000–2004. The basis for selecting this time frame is that (i) exploring the short- and medium-term effects of TCID: that is, the policy effects of one year (short-term) and two-to-six years (medium-term). Since the period from 2000 to 2004 overlaps with the peak period of this type of reform, the inclusion of the TCID sample from this period as the experimental group ensures that there are sufficient data to discuss the development of economic effects and public services before and after such reforms. (ii) It can be seen from Figure 1 that the second peak in TCID policy implementation occurred in 2011. It is not easy to analyze the medium-term effects of TCID policies. Therefore, this paper does not consider the research samples at this stage. (iii) The existing studies surrounding Chinese TCID policies also include TCID samples from the period 2000–2004 [6, 25].

3.2.2. Sample Range of the Study. The county-level samples in this study are mainly divided into two groups: the experimental group and the control group. The former mainly consists of county-level samples that experienced TCID reforms from 2000 to 2004. The latter mainly includes subordinate counties that have not undergone TCID in the same cities and subordinate counties of 70 large- and medium-sized metropolitan areas in China. Incorporating the subordinate counties of 70 large- and medium-sized cities into the control group is mainly based on the fact that the probability of occurrence of TCID policy implementation in large- and medium-sized cities is relatively high. Adding these samples draws the characteristics of the control and experimental group samples closer. This both effectively reduces the selective bias of DID analysis and improves the accuracy of PSM-DID analysis.

It should be noted that during the actual data analysis, areas and flags parallel to the county in the selection of the control sample were not considered in order to ensure the consistency of sample characteristics, and a large number of

missing data that occurred during the sample period was excluded, and interpolation was used to fill in records with obvious anomalies and a small amount of missing data.

3.3. Data Sources. The data used in the study mainly includes administrative division reform data and economic and social statistics. Among them, the administrative division reform data come from the official website of the Ministry of Civil Affairs (<https://xzqh.mca.gov.cn/description?dcpid=1>) and the administrative division network (<https://www.xzqh.org>). These two websites record in detail the relevant information on the administrative changes of county-level units in China each year. The county-level economic and social statistics mainly come from the government's public statistical yearbook, including the "China County Statistical Yearbook" (2000–2011) and the "China Statistical Yearbook for Regional Economy" (2002–2011), as well as local economic and social statistics [26].

3.4. Variable Selection and Descriptive Statistics. This study uses China's 453 county-level panel data from 1999 to 2010 to evaluate the impact of TCID policies, controlling for various economic factors that affect county economic growth and public service development. The detailed calculation method for all variables is shown in Table 1.

In order to measure regional economic growth and the level of public service development, according to the common practice in the literature, take the per capita GDP (pergdp) of a county, the number of students enrolled per 10,000 people (education), and the number of beds in hospitals and health centers per 10,000 people (medical) as dependent variables. One of the core indicators used in this paper is the dummy variable of the TCID (reform). In the scope of the sample in this paper, if a county carried out TCID reform during the period 2000–2004, then the dummy variable is assigned a value of 1 for 2005 and beyond; otherwise, the value is 0. In the process of using the PSM-DID method for the subsequent robustness test, the specified regional variable is the individual ID, and the logit model is used to estimate the propensity score and perform kernel matching [27, 28].

Since the economic growth and development of public services of a county are affected by many factors, to control the interference of other unobservable factors, control variables are required. The size of the administrative scale (adm) and the size of the population (lnpop) reflect the size and volume of a county, which is an important exogenous variable that affects the economic and social development of the region and, therefore, must be controlled [25]. Agriculture is a major industry at the county level. The level of modernization and output capacity of agriculture in each county are quite different, as is the impact on economic and social development. Therefore, the focus is on controlling the effects of several agricultural variables (agri-mod, agri-dev, lnagri-output, and lnhusbandry-output) on regression. Differences in the economic structure are an important cause of regional differences in the rates of economic growth. The level of industrialization (industry) can test the role of

TABLE 1: Main variables and calculation method.

Variable	Meaning	Calculation method
pergdp	Economic growth level	Per capita GDP
education	Education level	Number of students enrolled per 10,000 people
medical	Medical level	Number of beds in hospitals and health centers per 10,000 people
reform	TCID	Dummy variable (0, 1)
adm	Administrative scale	Per capita administrative area
lnpop	Population size	Logarithm of the total population
agri-mod	Agricultural modernization level	Total power of agricultural machinery
agri-dev	Agricultural development level	The added value of the primary industry accounts for the proportion of GDP
lnagri output	Agricultural output capacity	Logarithm of total grain output
lnhusbandry output	Husbandry output capacity	Logarithmic value of meat production
industry	Industrialization level	The added value of the secondary industry accounts for the proportion of GDP
revenue	Government income level	Fiscal revenue as a percentage of GDP
expenditure	Government expenditure level	Fiscal expenditure as a share of GDP
sav	Savings rate	Urban-rural deposit balance as a percentage of GDP
finance	Financial operation level	Urban-rural loans as a percentage of GDP

structural factors in a county's economic and social development. Second, in the development of a county's economy in China's transitional period, the government plays an important role. The government's income and expenditures are closely related to regional economic growth and public service provision. Therefore, fiscal revenue and fiscal expenditure as a percentage of GDP (revenue and expenditure) were chosen to measure the government's impact on economic and social development at the county level. In addition, savings rates (sav) and loan levels (finance) affect the level of investment and consumption in society and show strong correlations with regional economic growth and public service development, so the impact of these financial variables on the regressions needed to be controlled for. Descriptive statistical results for each variable are shown in Table 2.

4. Evaluation Results and Robustness Test

4.1. A Preliminary Examination of the Effect of TCID Reforms on Economic Growth and Public Service Development. As an important measure of China's urban development strategy, the implementation of TCID reforms provides a quasi-natural experiment. This paper uses the DID method to evaluate the net effect of TCID reform on a county's economic growth and public service development. The regression results are shown in Table 3.

Columns (1), (2), and (3) in Table 3 are estimates of pergdp, education, and medical, respectively. It can be found that, in the short term, and the interaction term $dt1 \times du1$ of pergdp is a positive value of 6102.4, which is significant at the 5% statistical level, indicating that TCID reform can promote the growth of a county's economy in the short term. As the years progress, the value of the interaction term and the level of significance also increase (from two to three stars), indicating that, over a longer time frame, the positive effect of TCID on a county's economic growth is stable. From the interactive items of education, it can be found that $dt1 \times du1$ to $dt6 \times du6$ are not significant, indicating that TCID reform has no obvious positive effect on the improvement of a county's education level. In the results of the medical

interaction items, the values of $dt1 \times du1$ to $dt6 \times du6$ are positive and are significant only in some years (2006, 2008, and 2009), indicating that TCID reform has a weak effect on promoting improvements in medical services. From these estimates, it is not difficult for us to conclude that TCID brings economic benefits to a county and that it has no effect on the development of public services, or that it has a weak positive impact.

The dynamic and robust estimation results of each control variable are shown in Table 4. It can be found that agri-mod, agri-dev, revenue, expenditure, and lnagri-output have a significant effect on the per capita GDP of a targeted county. Among them, agri-mod and revenue have a positive effect on the per capita GDP, and the rest are negative. From the dynamic effects of education and medical services, it can be found that agri-mod, agri-dev, and sav have a significant positive effect on the improvement of a county's education level, and lnagri-output has a significant negative effect on education. The variables agri-mod and sav have a significant positive effect on the improvement of medical services, and lnpop, agri-dev, and lnagri-output have a significant negative effect on medical. The impact of the remaining variables on county-level economic growth and public service development is not significant or robust.

4.2. Further Robustness Test. The DID method can effectively eliminate the bias caused by unobservable factors that do not change with time, but there are still endogeneity problems caused by selective bias. To overcome systematic differences between the experimental and control groups and to reduce the bias in the DID estimates, further robustness tests were performed using the PSM-DID method. First, logit regression is performed on the control variables through reform, and the weight matrix is constructed using the predicted propensity score; then, the policy's effect is estimated according to the kernel matching method. In this process, it is also necessary to check whether the distribution of each variable in the experimental and control groups becomes balanced after such matching and whether the mean value of the covariate is still significantly different

TABLE 2: Descriptive statistical results.

Variable	Obs	Mean	Std. dev	Min	Max
pergdp	5436	14643.25	15405.77	263.423	154000
education	5436	1461.722	360.222	103.83	5043.04
medical	5436	20.475	9.962	1	96.453
reform	5436	0.056	0.229	0	1
adm	5436	46.174	58.409	0.889	1240.633
lnpop	5436	3.942	0.619	1.386	6.746
agri-mod	5436	36.584	34.059	0.6	300
agri-dev	5436	0.248	0.204	0.006	0.974
lnagri-output	5436	12.198	0.992	2.197	14.922
lnhusbandry-output	5436	10.388	0.978	2.944	13.416
industry	5436	0.466	0.319	0	0.982
revenue	5436	0.045	0.033	0.003	1.012
expenditure	5436	0.111	0.086	0.006	1.987
sav	5436	0.611	0.41	0.001	14.724
finance	5436	0.52	0.419	0	12.35

TABLE 3: DID dynamics test results of TCID on economic growth and public service development.

Variable	(1)	(2)	(3)
	pergdp	education	medical
<i>dt1</i>	5112.8*** (709.7)	-314.0*** (31.19)	-0.894 (0.795)
<i>dt2</i>	3827.8*** (609.9)	-359.5*** (30.84)	-1.393* (0.802)
<i>dt3</i>	11353.2*** (1260.5)	-431.2*** (35.08)	0.551 (0.949)
<i>dt4</i>	15297.2*** (1539.0)	-488.2*** (35.98)	1.657* (0.962)
<i>dt5</i>	18433.2*** (1842.6)	-551.7*** (35.83)	2.140** (0.999)
<i>dt6</i>	24241.9*** (2205.2)	-590.0*** (37.55)	4.010*** (1.119)
<i>du1</i>	3147.8*** (754.5)	10.32 (71.61)	2.068 (1.374)
<i>du2</i>	3897.3*** (835.1)	-65.24 (63.74)	3.925*** (1.319)
<i>du3</i>	3112.8*** (896.0)	-50.85 (65.94)	2.426** (1.220)
<i>du4</i>	2541.4*** (978.9)	-47.09 (65.70)	2.337* (1.259)
<i>du5</i>	2817.6*** (1083.8)	-56.10 (63.89)	2.240* (1.209)
<i>du6</i>	3217.5** (1249.1)	-48.12 (63.83)	2.419** (1.219)
<i>dt1</i> × <i>du1</i>	6120.4** (2454.9)	21.78 (93.97)	3.103 (2.694)
<i>dt2</i> × <i>du2</i>	13203.6*** (3080.0)	-3.864 (93.03)	6.453** (2.803)
<i>dt3</i> × <i>du2</i>	8774.3** (3472.9)	46.15 (89.44)	3.438 (2.426)
<i>dt4</i> × <i>du4</i>	10923.1*** (4090.0)	22.38 (92.94)	4.356* (2.408)
<i>dt5</i> × <i>du5</i>	12555.1*** (4093.0)	8.710 (82.61)	4.353* (2.358)
<i>dt6</i> × <i>du6</i>	15442.6*** (4820.2)	5.327 (83.92)	3.953 (2.492)

TABLE 3: Continued.

Variable	(1)	(2)	(3)
	pergdp	education	medical
Other control variables	Yes	Yes	Yes
<i>_cons1</i>	48256.5*** (7939.1)	2641.0*** (318.8)	45.81*** (9.120)
<i>_cons2</i>	38958.4*** (6195.0)	2908.3*** (234.5)	45.86*** (6.849)
<i>_cons3</i>	73093.3*** (11715.6)	2472.6*** (370.5)	43.73*** (8.326)
<i>_cons4</i>	80665.0*** (13029.7)	2398.0*** (348.7)	41.97*** (7.433)
<i>_cons5</i>	91320.5*** (17012.1)	2647.8*** (271.1)	46.69*** (8.230)
<i>_cons6</i>	102539.9*** (17630.2)	2526.8*** (257.0)	49.61*** (8.548)
<i>N</i>	906	906	906
<i>R</i> ₁ ²	0.622	0.238	0.349
<i>R</i> ₂ ²	0.535	0.275	0.308
<i>R</i> ₃ ²	0.629	0.322	0.326
<i>R</i> ₄ ²	0.632	0.363	0.341
<i>R</i> ₅ ²	0.635	0.420	0.343
<i>R</i> ₆ ²	0.646	0.463	0.353

Standard errors in parentheses, **p* < 0.1, ***p* < 0.05, ****p* < 0.01.

between the experimental and control groups. If there is no significant difference, the application of the PSM-DID method is supported. After the covariate test, there was no significant difference between the experimental and control groups in our study³. The distribution of each variable in the experimental and control groups became balanced, indicating that it was appropriate to use the PSM-DID method. A kernel matching approach was used to estimate and test the robustness of the TCID effect. The estimated results are shown in Table 5.

The data results show that the short-term interaction coefficient *pergdp* is 6757.8, which is highly significant, and has a little difference from the results of ordinary DID. From the medium-term effect, the corresponding results of PSM-DID *pergdp* and DID are not very different in terms of coefficients and significance. The per capita GDP of the

TABLE 4: DID dynamics test results of various control variables on economic growth and public service development.

Variable	lnpop	agri-mod	agri-dev	revenue	expenditure	sav	lnagri-output	lnhusbandry-output
Per capita GDP		+	-	+	-		-	
Education		+	+			+	-	
Medical	-	+	-			+	-	+

“+” in the table represents positive action and “-” represents negative effect.

TABLE 5: PSM-DID dynamics test results of TCID on economic growth and public service development.

Variable	(1) pergdp	(2) education	(3) medical
<i>dt1</i>	8243.7*** (1180.7)	-309.5*** (38.11)	2.010* (1.025)
<i>dt2</i>	3270.0** (1278.1)	-362.3*** (40.04)	3.408*** (1.102)
<i>dt3</i>	15235.6*** (1737.2)	-409.1*** (40.98)	4.386*** (1.070)
<i>dt4</i>	20137.7*** (2104.9)	-456.0*** (41.73)	4.975*** (1.032)
<i>dt5</i>	23424.2*** (2228.7)	-501.9*** (37.96)	6.575*** (1.064)
<i>dt6</i>	30250.9*** (2552.4)	-551.0*** (38.12)	8.857*** (1.107)
<i>du1</i>	2866.6** (1167.5)	-53.78 (37.69)	3.339*** (1.013)
<i>du2</i>	2010.3 (1271.3)	-78.55** (39.83)	2.363** (1.096)
<i>du3</i>	2010.3 (1728.0)	-78.55* (40.77)	2.363** (1.064)
<i>du4</i>	2010.3 (2093.7)	-78.55* (41.51)	2.363** (1.027)
<i>du5</i>	1879.8 (2215.3)	-104.1*** (37.73)	2.303** (1.057)
<i>du6</i>	1847.9 (2536.6)	-83.61** (37.88)	2.162** (1.100)
<i>dt1</i> × <i>du1</i>	6757.8*** (1660.5)	37.44 (53.60)	2.493* (1.441)
<i>dt2</i> × <i>du2</i>	14770.9*** (1802.8)	65.80 (56.47)	2.517 (1.555)
<i>dt3</i> × <i>du3</i>	8204.9*** (2450.3)	72.08 (57.81)	2.071 (1.509)
<i>dt4</i> × <i>du4</i>	9867.2*** (2968.9)	71.63 (58.86)	3.035** (1.456)
<i>dt5</i> × <i>du5</i>	10516.3*** (3142.4)	34.94 (53.52)	2.387 (1.500)
<i>dt6</i> × <i>du6</i>	11105.0*** (3598.5)	30.78 (53.75)	1.521 (1.561)
Other control variables	Yes	Yes	Yes
_cons1	8370.9*** (825.6)	1760.9*** (26.65)	19.39*** (0.717)
_cons2	8380.4*** (899.0)	1723.5*** (28.16)	19.65*** (0.775)
_cons3	8380.4*** (1221.9)	1723.5*** (28.83)	19.65*** (0.753)
_cons4	8380.4*** (1480.5)	1723.5*** (29.35)	19.65*** (0.726)

TABLE 5: Continued.

Variable	(1) pergdp	(2) education	(3) medical
_cons5	8450.8*** (1566.5)	1737.5*** (26.68)	19.59*** (0.748)
_cons6	8364.6*** (1793.6)	1730.5*** (26.79)	19.41*** (0.778)
N1	645	645	645
N2	641	641	641
N3	641	641	641
N4	641	641	641
N5	637	637	637
N6	655	655	655
R_1^2	0.298	0.158	0.091
R_2^2	0.332	0.180	0.087
R_3^2	0.310	0.211	0.104
R_4^2	0.334	0.246	0.150
R_5^2	0.367	0.349	0.173
R_6^2	0.394	0.383	0.205

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

counties that implemented the TCID reform was 10,892.9 yuan/person higher than that of the counties without the TCID reform (averaged by the $dt2 \times du2$ to $dt6 \times du6$ coefficients). In the educational interaction project, the coefficients of $dt1 \times du1 \sim dt6 \times du6$ are still insignificant, indicating that the result that the TCID reform has no significant impact on the improvement of county education levels is stable. Among the medical interaction items, only the $dt1 \times du1$ (2005) and $dt4 \times du4$ (2008) coefficients were significant. Compared with the previous DID dynamic test results, the medium-term effects of TCID reforms were further weakened, verifying that such reforms have limited effects on improving medical services.

4.3. Inspection of the Impact Mechanism of TCID Reforms.

From the results of various types of inspections in the previous article, it can be found that TCID reforms can promote the growth of a county’s economy, but they fail to accelerate the development of public services. So, what factors have led to this reality? To this end, the causes of the TCID reforms were identified by examining their role in the various drivers of economic and social growth. Table 6 shows the test results of the impact mechanism of TCID reforms.

In Table 6, the interaction term, which represents the net impact of TCID reforms on the growth drivers of major economies and societies, is the key observation object of this paper. The regression results in Table 6 show that TCID reforms are significantly positive for revenue and are

TABLE 6: PSM-DID dynamic test results of TCID impact mechanism.

Variables	(1) lnpop	(2) agri-mod	(3) agri-dev	(4) revenue	(5) expenditure	(6) sav	(7) lnagri-output	(8) lnhusbandry-output
<i>dt1</i>	0.00353 (0.0521)	10.54*** (3.047)	-0.0487*** (0.0102)	0.00458** (0.00202)	0.0232*** (0.00605)	0.0394 (0.0310)	-0.176* (0.0977)	0.637*** (0.0875)
<i>dt2</i>	0.0204 (0.0506)	12.87*** (3.097)	-0.00855 (0.0105)	0.0459*** (0.00436)	0.0767*** (0.00666)	0.563*** (0.0495)	0.679*** (0.0740)	0.679*** (0.0740)
<i>dt3</i>	0.0272 (0.0507)	14.59*** (3.172)	-0.0724*** (0.0101)	0.0117*** (0.00245)	0.0393*** (0.00621)	0.0212 (0.0294)	-0.117 (0.0995)	0.586*** (0.0803)
<i>dt4</i>	0.0296 (0.0507)	17.39*** (3.257)	-0.0819*** (0.00981)	0.0133*** (0.00254)	0.0481*** (0.00651)	0.0461 (0.0312)	-0.0920 (0.132)	0.576*** (0.0777)
<i>dt5</i>	0.0374 (0.0511)	20.84*** (3.379)	-0.0920*** (0.00966)	0.0153*** (0.00250)	0.0561*** (0.00721)	0.0905*** (0.0317)	-0.0824 (0.102)	0.635*** (0.0782)
<i>dt6</i>	0.0418 (0.0511)	26.28*** (3.584)	-0.0998*** (0.00952)	0.0193*** (0.00256)	0.0612*** (0.00698)	0.0749** (0.0324)	-0.0789 (0.101)	0.671*** (0.0775)
<i>du1</i>	-0.0130 (0.0514)	-0.646 (2.976)	-0.0110 (0.0101)	-0.0000935 (0.00200)	0.00783 (0.00601)	0.168*** (0.0307)	0.0757 (0.0968)	0.188** (0.0849)
<i>du2</i>	-0.0324 (0.0503)	-5.974* (3.080)	-0.0192* (0.0104)	-0.000219 (0.00434)	0.00716 (0.00663)	0.134*** (0.0490)	0.272*** (0.0740)	0.272*** (0.0740)
<i>du3</i>	-0.0324 (0.0505)	-5.974* (3.155)	-0.0192* (0.0100)	-0.000219 (0.00244)	0.00716 (0.00618)	0.134*** (0.0291)	0.0819 (0.0989)	0.272*** (0.0803)
<i>du4</i>	-0.0324 (0.0505)	-5.974* (3.240)	-0.0192* (0.00976)	-0.000219 (0.00253)	0.00716 (0.00648)	0.134*** (0.0309)	0.0819 (0.131)	0.272*** (0.0777)
<i>du5</i>	-0.0188 (0.0509)	-8.092** (3.357)	-0.0211** (0.00959)	-0.00103 (0.00249)	0.00766 (0.00717)	0.138*** (0.0314)	0.123 (0.102)	0.276*** (0.0782)
<i>du6</i>	-0.0159 (0.0508)	-6.546* (3.557)	-0.0168* (0.00941)	-0.000501 (0.00254)	0.00833 (0.00695)	0.132*** (0.0321)	0.137 (0.100)	0.251*** (0.0775)
<i>dt1</i> × <i>du1</i>	-0.00540 (0.0732)	-8.056* (4.239)	-0.0480*** (0.0143)	0.00648** (0.00283)	0.00199 (0.00848)	-0.0639 (0.0434)	-0.398*** (0.137)	0.0552 (0.120)
<i>dt2</i> × <i>du2</i>	-0.0345 (0.0710)	-7.466* (4.368)	-0.0914*** (0.0148)	-0.0324*** (0.00613)	-0.0473*** (0.00940)	-0.548*** (0.0694)	0.0553 (0.105)	0.0553 (0.105)
<i>dt3</i> × <i>du3</i>	-0.0164 (0.0713)	-8.160* (4.474)	-0.0325** (0.0142)	0.00947*** (0.00345)	-0.000283 (0.00876)	-0.0598 (0.0412)	-0.368*** (0.140)	-0.0500 (0.114)
<i>dt4</i> × <i>du4</i>	-0.00536 (0.0713)	-9.381** (4.594)	-0.0300** (0.0138)	0.00972*** (0.00357)	-0.00285 (0.00919)	-0.0566 (0.0437)	-0.507*** (0.185)	-0.0898 (0.110)
<i>dt5</i> × <i>du5</i>	0.00411 (0.0719)	-10.19** (4.763)	-0.0271** (0.0136)	0.0106*** (0.00353)	0.00246 (0.0102)	-0.0898** (0.0445)	-0.387*** (0.144)	-0.0625 (0.111)
<i>dt6</i> × <i>du6</i>	0.0268 (0.0720)	-14.22*** (5.030)	-0.0274** (0.0134)	0.0105*** (0.00361)	0.000720 (0.00985)	-0.0765* (0.0454)	-0.368*** (0.142)	-0.0863 (0.110)
_cons1	4.072*** (0.0363)	32.65*** (2.124)	0.227*** (0.00712)	0.0365*** (0.00141)	0.0573*** (0.00425)	0.526*** (0.0219)	12.43*** (0.0684)	9.959*** (0.0617)
_cons2	4.198*** (0.0356)	35.06*** (2.178)	0.236*** (0.00739)	0.0355*** (0.00307)	0.0557*** (0.00469)	0.522*** (0.0349)	9.984*** (0.0523)	9.984*** (0.0523)
_cons3	4.198*** (0.0357)	35.06*** (2.231)	0.236*** (0.00710)	0.0355*** (0.00173)	0.0557*** (0.00437)	0.522*** (0.0207)	12.51*** (0.0699)	9.984*** (0.0568)
_cons4	4.198*** (0.0357)	35.06*** (2.291)	0.236*** (0.00690)	0.0355*** (0.00179)	0.0557*** (0.00458)	0.522*** (0.0220)	12.51*** (0.0925)	9.984*** (0.0549)
_cons5	4.209*** (0.0360)	36.41*** (2.374)	0.236*** (0.00678)	0.0357*** (0.00176)	0.0541*** (0.00507)	0.518*** (0.0224)	12.52*** (0.0721)	9.977*** (0.0553)
_cons6	4.205*** (0.0359)	36.98*** (2.515)	0.237*** (0.00665)	0.0351*** (0.00180)	0.0530*** (0.00492)	0.521*** (0.0228)	12.54*** (0.0710)	10.01*** (0.0548)
N1	663	657	659	656	674	667	634	575
N2	666	681	679	662	681	677	674	674
N3	666	681	679	662	681	677	639	674
N4	666	681	679	662	681	677	639	674
N5	646	681	681	653	675	687	620	670

TABLE 6: Continued.

Variables	(1) lnpop	(2) agri-mod	(3) agri-dev	(4) revenue	(5) expenditure	(6) sav	(7) lnagri-output	(8) lnhusbandry-output
N_6	665	686	681	673	697	683	640	673
R_1^2	0.000	0.026	0.176	0.060	0.053	0.059	0.063	0.193
R_2^2	0.003	0.056	0.200	0.184	0.195	0.178	0.244	0.244
R_3^2	0.002	0.063	0.216	0.140	0.109	0.040	0.042	0.148
R_4^2	0.002	0.076	0.251	0.153	0.134	0.037	0.038	0.142
R_5^2	0.002	0.104	0.287	0.191	0.163	0.036	0.036	0.173
R_6^2	0.004	0.121	0.318	0.233	0.187	0.032	0.032	0.179

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

significantly negative for agri-mod and agri-dev. According to the previous regression results, agri-mod and revenue have positive effects on a county's economic growth, while agri-dev has a negative effect. The results show that, in addition to suppressing the positive effect of agricultural modernization on economic growth⁴, TCID reforms can increase government revenue, slow down the negative impact of agricultural development on economic growth, and thus benefit the county's economic growth overall. The regression results of the previous article on education show that agri-mod and agri-dev have a significant positive effect on the improvement of a county's education level. It should be noted that TCID not only inhibits the positive effect of agricultural modernization on education but also reduces the positive effect of agricultural development on it. The previous regression results of the impact on medical services show that agri-mod has a significant positive effect on the improvement of medical services and that agri-dev has a negative effect on it. Combined with the results from Table 6, the TCID reforms not only reduce the positive effect of agricultural modernization on the improvement of medical services, but they also inhibit the adverse effects of agricultural development on it. Therefore, TCID reforms have only a weak and unsteady positive impact on the improvement of a county's medical services.

The analysis of the above mechanism shows that the impact of TCID reforms on the economic growth of a county is robust and powerful, and that major economic drivers are developing in a direction that is conducive to economic growth after such reforms are implemented. In the areas of education and medical/public services, such reforms have only produced an "extrusion effect," and there are trade-offs between various drivers. The actual effect of TCID reforms on the development of public services is minimal.

5. Conclusion

In recent years, in the construction of a new pattern of urbanization dominated by urban agglomerations, major cities have promoted the implementation of TCID reforms. Whether they can bring economic growth to a targeted county, especially in terms of the improvement of public services, is an important issue that should be studied at present. Using panel data from 453 counties in China from 1999–2010, this study analyses the short- and medium-term impacts of TCID reforms on economic growth and public service development using the DID methodology. The main

conclusions of the study are as follows: (1) TCID reforms have a significant and stable positive effect on a county's economic growth. The GDP of a county that has experienced TCID reforms is 6757.8 yuan per person higher than that of a county that has not experienced them in the short term, and the average value is 10892.9 yuan per person in the medium term. (2) TCID reforms do not significantly increase a county's education level. They have a significant positive effect on the level of medical services only in some years, and the regression results are not stable. (3) Further results of mechanism identification show that TCID reforms can promote the development of major economic drivers in the direction of economic growth. In terms of education and medical or public services, such reforms have only produced an "extrusion effect."

This paper provides empirical evidence for the comprehensive evaluation of the actual effects of the reform of administrative divisions under TCID policies. At present, under the strong influence of new urban development patterns, counties have become more integrated into the development of metropolitan areas through TCID reforms. Such measures can be either good or bad for the development of a county. The analysis in this paper finds that TCID reforms are beneficial to counties at least in terms of economic growth, but TCID reforms have not played a positive role in improving the level of education or medical/public services. This conclusion warns us that in future TCID reforms, local governments should pay special attention to introducing this "policy dividend" in a way that improves public services.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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